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<p>(21) Internationales Aktenzeichen: PCT/EP97/06556</p> <p>(22) Internationales Anmeldedatum: 24. November 1997 (24.11.97)</p> <p>(30) Prioritätsdaten:          196 49 895.3      2. Dezember 1996 (02.12.96)      DE</p> <p>(71) Anmelder (für alle Bestimmungsstaaten ausser US): HENKEL          KOMMANDITGESELLSCHAFT AUF AKTIEN [DE/DE];          Henkelstrasse 67, D-40589 Düsseldorf (DE).</p> <p>(72) Erfinder; und</p> <p>(75) Erfinder/Anmelder (nur für US): SCHELGES, Heike          [DE/DE]; Bacher Strasse 170, D-47807 Krefeld (DE).          SCHOLZ, Wolfrard [DE/DE]; Edmundstrasse 26, D-47829          Krefeld (DE). SCHOSSER, Gryta [DE/DE]; Husumer Weg          31, D-47829 Krefeld (DE).</p>	<p>(81) Bestimmungsstaaten: CA, CN, CZ, HU, NO, PL, SK, US,          europäisches Patent (AT, BE, CH, DE, DK, ES, FI, FR,          GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Veröffentlicht</b>  <i>Mit internationalem Recherchenbericht.          Vor Ablauf der für Änderungen der Ansprüche zugelassenen          Frist. Veröffentlichung wird wiederholt falls Änderungen          eintreffen.</i></p>	
<p>(54) Title: FOAMING BODY-CLEANSING AGENTS</p> <p>(54) Bezeichnung: SCHÄUMENDE KÖRPERREINIGUNGSMITTEL</p> <p>(57) Abstract</p> <p>This invention concerns foaming aqueous compositions of body-cleansing agents containing anionic surfactants (A) with a strong foaming action and alkyl-(oligo)-glucosides (B) which are easily tolerated by the skin, and a combination of a zwitterionic surfactant (C), e.g., a betaine surfactant, and an ampholytic surfactant (D), e.g., a cocoamphoglycinate, to improve foaming properties and viscosity. Combining betaine and ampholytic surfactants yields a particularly creamy foam structure, consisting of particularly tiny bubbles when using said compositions.</p> <p>(57) Zusammenfassung</p> <p>Schäumende wässrige Körperreinigungsmittel-Zusammensetzungen enthalten schaumstarke, hautverträgliche anionische Tenside (A) und Alkyl-(oligo)-glucoside (B) sowie zur Verbesserung der Schäumeigenschaften und der Viskosität eine Kombination aus einem zwitterionischen Tensid (C), z.B. einem Betaintensid und einem ampholytischen Tensid (D), z.B. einem Cocoamphoglycinat. Durch die Kombination aus Betain- und Amphotensid wird eine besonders cremige und feinblasige Schaumstruktur bei der Anwendung erreicht.</p>		

### Foaming Body-cleansing Agents

This invention relates to foaming body-cleansing compositions in the form of a liquid surfactant composition based on a combination of high-foaming anionic surfactants and foam-boosting alkyl (poly)glycosides which contain a combination of a zwitterionic surfactant and an ampholytic  
5 surfactant for further improving the properties of the foam, more particularly its fine-bubble character and its stability (creaminess).

Liquid body-cleansing compositions which are marketed, for example, as liquid soaps, shampoos, shower bath preparations and foam bath additives are not only expected to have a good cleansing effect, they  
10 are also expected to show high skin and mucous membrane compatibility and not to overly degrease or dry the skin, even in the event of frequent use. In addition to this, however, consumers also evaluate performance properties according to the quality and quantity of the foam formed in use. In particular, consumers look for rapid initial foaming with formation of a  
15 fine-bubble and stable foam, these properties of the foam also being generally described as creaminess.

The body-cleansing formulations themselves are also expected to be distinguished by a certain viscosity so that, for example, they can be applied to the hand and do not trickle through the fingers before they can  
20 be spread over the body or the head.

There are many known surfactants which are kind to the skin and compatible with the mucous membrane. However, there are only a few surfactants which meet the additional need for a certain viscosity of the aqueous solution and for a fine-bubble character of the foam. For this  
25 reason, combinations of various surfactants have always been used hitherto in order to satisfy these various requirements. Thus, a combination of alkyl ether sulfate surfactants and alkyl (poly)glucosides has

WO 98/24409

2

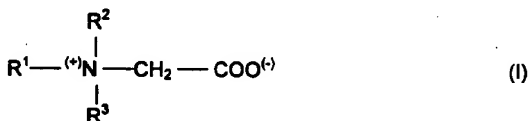
PCT/EP97/06556

proved to be particularly high-foaming and dermatologically compatible. In addition, zwitterionic surfactants or betaine surfactants and ampholytic surfactants are known for their ability, in combination with anionic surfactants, to improve the dermatological compatibility of those surfactants and to impart a relatively high viscosity to aqueous preparations or to improve their thickenability by electrolyte salts.

DE-A-42 34 487, for example, describes an aqueous detergent composition containing alkyl sulfate surfactants, alkyl ether sulfate surfactants, alkyl (oligo)glucosides and amphoteric or zwitterionic surfactants.

However, it has now been found that the properties of the foam, more especially its fine-bubble character and stability, can be further improved by using a combination of a zwitterionic surfactant and an ampholytic surfactant instead of a betaine surfactant or ampholytic surfactant.

Accordingly, the present invention relates to aqueous body-cleansing compositions containing high-foaming, dermatologically compatible anionic surfactants (A) and alkyl (oligo)glycosides (B), characterized in that they contain a combination of a zwitterionic surfactant (C) corresponding to formula I:

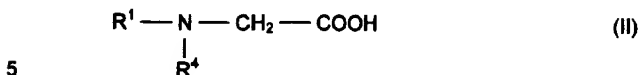


WO 98/24409

3

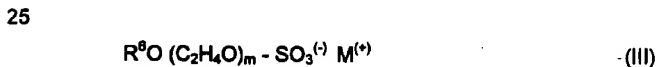
PCT/EP97/06556

and an ampholytic surfactant (D) corresponding to formula II:



in which R<sup>1</sup> is an alkyl or alkenyl group containing 12 to 18 carbon atoms or a group R<sup>5</sup> — CONH — (CH<sub>2</sub>)<sub>n</sub>, where R<sup>5</sup> is an alkyl or alkenyl group containing 12 to 18 carbon atoms and n is a number of 2 to 4, and R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are alkyl groups containing 1 to 4 carbon atoms or hydroxyalkyl groups containing 2 or 3 carbon atoms, in a ratio by weight of (A) to (B) to (C + D) of 10:(0.5-5):(1-5) in order further to improve their foam properties and their viscosity.

High-foaming, dermatologically compatible anionic surfactants (A) are known to the expert in large numbers from relevant handbooks and are commercially available. More particularly, they are alkyl sulfates in the form of their ammonium or alkanolammonium salts, alkyl ether sulfates, alkyl ether carboxylates, acyl isethionates, acyl sarcosinates, acyl taurines with linear alkyl or acyl groups containing 12 to 18 carbon atoms and in the form of their alkali metal or ammonium salts. The anionic surfactants (A) may be present in the compositions according to the invention in a quantity of 3 to 30% by weight. Particularly preferred anionic surfactants are alkyl ether sulfates. Accordingly, at least one alkyl ether sulfate surfactant corresponding to the formula III:



in which R<sup>6</sup> is an alkyl or alkenyl group containing 12 to 18 carbon atoms, m = 1 - 4 and M<sup>(+)</sup> is an alkali metal, magnesium, ammonium or alkanol-ammonium ion, is preferably present as the anionic surfactant in a quantity of at least 5% by weight, based on the composition as a whole.

WO 98/24409

4

PCT/EP97/06556

Alkyl (ligo)glycosides (B) are well-known surface-active substances which can be produced from sugars and aliphatic primary alcohols containing 8 to 22 carbon atoms by acetalization. Sugar components (glycoses) include – preferably – glucose and also fructose, mannose, galactose, talose, gulose, allose, idose, arabinose, xylose, lyxose, ribose and mixtures thereof. The acetalization products of glucose with fatty alcohols obtainable, for example, from natural oils and fats by known methods are preferably used by virtue of their ready accessibility and their favorable applicational properties.

So far as the glycoside unit is concerned, both monoglycosides and oligoglycosides where a sugar unit is attached to the fatty alcohol by a glycosidic bond are suitable. Mixtures of mono- and oligoglucosides are usually present in the commercially available products.

Preferred alkyl (oligo)glycosides (B) are those with the formula  $R^7(G)_x$ , where  $R^7$  is a linear alkyl group containing 8 to 16 carbon atoms and  $(G)_x$  is an (oligo)glucoside unit with an average degree of oligomerization  $x$  of 1 to 2.

Such products are commercially available, for example, under the trade mark Plantaren® or Plantacare®.

Zwitterionic surfactants (C) corresponding to formula I are also well-known and are commercially available in large numbers. The most well known and most widely used group of these surfactants are the betaine surfactants in which  $R^2$  and  $R^3$  are methyl groups. Among the betaine surfactants, there are the alkyl betaines where  $R^1$  is an alkyl or alkenyl group and the amidobetaines where  $R^1$  is a group  $R^5\text{CONH}-(\text{CH}_2)_n-$ . A cocoamidopropyl betaine of formula I, where  $R^1$  is a group  $R^5\text{CONH}-(\text{CH}_2)_3-$ , in which  $R^5\text{CO}$  is derived from a  $\text{C}_{12-18}$  cocofatty acid or palm kernel oil fatty acid, and  $R^2$  and  $R^3$  are methyl groups, is preferably used for the purposes of the invention. Such products are commercially available, for example, under the trade mark Dehyton®K.

WO 98/24409

5

PCT/EP97/08556

Ampholytic surfactants (D) corresponding to formula II are also known and commercially available surfactants. They have the ability to react like cationic surfactants in acidic solution by protonation at the tertiary nitrogen atom and like anionic surfactants in the alkaline range by salt formation at the carboxyl group. A preferred ampholytic surfactant (D) is a cocoamphoglycinate corresponding to formula II where  $R^1$  is a group  $R^5CONH-(CH_2)_2-$ , in which  $R^5CO$  is derived from a  $C_{12-18}$  cocofatty acid or palm kernel oil fatty acid, and  $R^4$  is a hydroxyethyl group. One such surfactant is commercially available, for example, under the trade mark

10 Dehyton®G.

Particularly favorable foam properties, more especially fine bubbles and creaminess, are obtained when the zwitterionic surfactant (C) and the ampholytic surfactant (D) are present in a ratio by weight of (C) to (D) of 1:(0.1-0.5).

15 Besides the compulsory components (A), (B), (C) and (D), the foaming aqueous preparations according to the invention may also contain other surfactants and additives. In quantitative terms, these other ingredients together should not make up any more than component (A).

Suitable other additives are, for example, nonionic surfactants,

20 water-soluble polymers, for example cationic polymeric conditioners, pearlescers, dyes, fragrances and emulsifiers suitable therefor, water-soluble polyols such as, for example, glycerol, sorbitol, propylene glycol or polyethylene glycol, electrolyte salts, pH regulators and cosmetic or dermatological agents.

25 If the total content of components (A) and (B) is less than 10% by weight, the viscosity of body-cleansing compositions according to the invention may still be unsatisfactory. One particular advantage of the compositions according to the invention is that, in cases such as these, viscosity can readily be increased by the addition of water-soluble inorganic

30 electrolyte salts.

WO 98/24409

6

PCT/EP97/06556

Suitable inorganic electrolyte salts are any water-soluble alkali metal, ammonium and alkaline earth metal salts, for example the fluorides, chlorides, bromides, sulfates, phosphates, nitrates and hydrogen carbonates, providing they are soluble in water at 20°C in a quantity of at least 1% by weight. Sodium chloride and magnesium chloride are preferably used.

The body-cleansing compositions according to the invention may be formulated as highly concentrated pastes with a water content of less than 30% by weight H<sub>2</sub>O or as dilute aqueous solutions containing less than 5% by weight of the anionic surfactant (A). However, the content of anionic surfactants (A) is preferably in the range from 5 to 20% by weight. In this range, body-cleansing compositions according to the invention suitable for use as shampoos or shower gels can be formulated with viscosities in the range from about 1 to 200 Pa·s (20°C).

The following Examples are intended to illustrate the invention:

### Examples

#### I. Surfactants used

- 20 Texapon®N70: C<sub>12/14</sub> cocofatty alcohol-2 EO-adduct sulfate, Na salt (70% paste)
- Dehyton®K: Cocoamidopropyl Betaine (30% solution)
- 25 
$$R-\text{CONH}-(\text{CH}_2)_3-\overset{(+)}{\text{N}}(\text{CH}_3)_2-\overset{(-)}{\text{CH}_2}-\text{COO}$$
  
R<sup>1</sup>CO = acyl group of C<sub>8-18</sub> cocofatty acid
- Dehyton®G: Cocoamphocarboxyglycinate (30% solution)
- 30 
$$R^2-\text{CONH}(\text{CH}_2)_2-\text{NH}(\text{CH}_2\text{CH}_2\text{OH})\text{CH}_2-\text{COOH}$$
  
R<sup>2</sup>CO = acyl group of C<sub>8-18</sub> cocofatty acid



WO 98/24409

7

PCT/EP97/06556

Plantacare® 818: C<sub>8-14</sub> alkyl polyglucoside (50% solution)  
R<sup>3</sup>-(G)<sub>x</sub>, R<sup>3</sup> = C<sub>8-14</sub>-n-alkyl group  
x = 1.4 G = glucoside unit

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Cetiol® HE: PEG7 Glyceryl Cocoate

Euperlan® PK 810: Pearlescing concentrate containing glycol di-  
stearate and Texapon N70.

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## II. Evaluation of foam volume and quality

Foaming behavior and foam properties were tested in a  
standardized arm washing test. 2 g of the composition were applied to the  
wet hand and spread over the hands and forearms. After 1 minute, the  
composition was washed off with water (15°C). Foaming behavior, foam  
volume and creaminess were evaluated by ten examiners. Their scores  
were averaged (1 = poor, 2 = adequate, 3 = good, 4 = very good).

15

WO 98/24409

8

PCT/EP97/08558

**Formulation**

% by weight	1	2V	3V	4V	5V	6V
Texapon N 70	15	15	15	17	18	16
Plantaren 818	2	2	2	4	-	-
Dehyton K	6	8	-	-	-	6
Dehyton G	2	-	8	-	2	2
Eurperlan PK 810	2	2	2	2	2	2
Cetiol HE	0.5	0.5	0.5	0.5	0.5	0.5
Merquat 550	0.5	0.5	0.5	0.5	0.5	0.5
Sorbitol	1.5	1.5	1.5	1.5	1.5	1.5
Glycerol	1.0	1.0	1.0	1.0	1.0	1.0
Sodium benzoate	0.4	0.4	0.4	0.4	0.4	0.4
Lactic acid*	0.1	0.1	0.1	0.1	0.1	0.1
Citric acid	0.4	0.4	0.4	0.4	0.4	0.4
Perfume oil	1.3	1.3	1.3	1.3	1.3	1.3
Water	67.3	67.3	67.3	71.3	72.3	68.3
NaCl	0.2	0.2	0.2	0.2	0.2	0.2
Foaming behavior	2.9	2.1	1.8	2.0	2.0	1.9
Foam volume	3.0	2.3	2.0	2.0	2.0	1.9
Creaminess, fine-bubble character	3.5	2.2	2.5	2.1	2.1	2.1
Viscosity Pa·s (20°C) Haake Rotovisko, Spindle 2	9.5	4.0	15.4	<1.0	<1.0	6.1

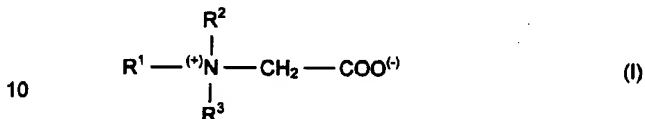
WO 98/24409

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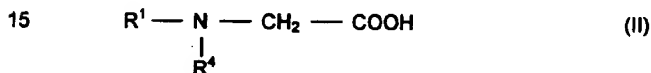
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## CLAIMS

1. A foaming aqueous body-cleansing composition containing high-foaming, dermatologically compatible anionic surfactants (A) and alkyl (oligo)glycosides (B), characterized in that it contains a combination of a  
 5 zwitterionic surfactant (C) corresponding to formula I:



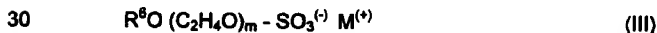
and an ampholytic surfactant (D) corresponding to formula II:



- in which R<sup>1</sup> is an alkyl or alkenyl group containing 12 to 18 carbon atoms or  
 20 a group R<sup>5</sup> - CONH - (CH<sub>2</sub>)<sub>n</sub>, where R<sup>5</sup> is an alkyl or alkenyl group containing 12 to 18 carbon atoms and n is a number of 2 to 4, and R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are alkyl groups containing 1 to 4 carbon atoms or hydroxyalkyl groups containing 2 or 3 carbon atoms,

- in a ratio by weight of (A) to (B) to (C + D) of 10:(0.5-5):(1-5)  
 25 in order further to improve its foam properties and its viscosity.

2. A foaming body-cleansing composition as claimed in claim 1, characterized in that at least one alkyl ether sulfate surfactant corresponding to formula III:



in which R<sup>6</sup> is an alkyl or alkenyl group containing 12 to 18 carbon atoms, m = 1 - 4 and M<sup>(+)</sup> is an alkali metal, magnesium, ammonium or alkanol-

WO 98/24409

10

PCT/EP97/06556

ammonium ion, is present as the anionic surfactant in a quantity of at least 5% by weight.

3. A foaming body-cleansing composition as claimed in claim 1, characterized in that an alkyl glucoside with the formula  $R^7(G)_x$ , where  $R^7$  is a linear alkyl group containing 8 to 16 carbon atoms and  $(G)_x$  is an (oligo)glucoside unit with a degree of oligomerization  $x$  of 1 to 2, is present as the alkyl (oligo)glycoside.
4. A foaming body-cleansing composition as claimed in any of claims 1 to 3, characterized in that a cocoamidopropyl betaine corresponding to formula I, in which  $R^1$  is a group  $R^5CONH-(CH_2)_3-$ , in which  $R^5CO$  is derived from a  $C_{12-18}$  cocofatty acid or palm kernel oil fatty acid, and  $R^2$  and  $R^3$  are methyl groups is present as the zwitterionic surfactant (C).
5. A foaming body-cleansing composition as claimed in any of claims 1 to 4, characterized in that a cocoamphoglycinate corresponding to formula II where  $R^1$  is a group  $R^5CONH-(CH_2)_2-$ , in which  $R^5CO$  is derived from a  $C_{12-18}$  cocofatty acid or palm kernel oil fatty acid, and  $R^4$  is a hydroxy ethyl group is present as the ampholytic surfactant (D).
6. A foaming body-cleansing composition as claimed in any of claims 1 to 5, characterized in that the zwitterionic surfactant (C) and the ampholytic surfactant (D) are present in a ratio by weight of (C) to (D) of 1:(0.1-0.5).